The Northwestern MILLER

MILLING PRODUCTION SECTION

The Separation of Weevil-Infested From Non-Infested Wheat by Flotation

By Gailen D. White

EDITOR'S NOTE: Mr. White is associated with the Stored-Grain Insects Laboratory at Manhattan, Kansas. The laboratory is one of the field stations of the Stored-Products Insects Section, Biological Services Branch, Marketing Research Division, Agricultural Marketing Service, U.S. Department of Agriculture.

Samples of hard red winter wheat, with 12% moisture content and infested with the rice weevil, were immersed in solutions of sodium silicate with specific gravities ranging from 1.050 to 1.350, in detailed laboratory studies to separate weevil-infested from noninfested wheat by flotation. In solutions with specific gravities of 1.190 or below, about 50 to 70% of the infested kernels were separated from the grain sample without any sound kernels floating. At a specific gravity of 1.350, all infested kernels floated, but 64% of the sound kernels floated also. Each sample was X-rayed to determine the exact number of infested kernels contained in it.

When infested samples were immersed in a two-layered liquid in which a sodium silicate solution with a specific gravity of 1.160 was floated on a methyl chloroform-kerosene solution with a specific gravity of 1.300, the top floating layer contained mostly kernels infested with advanced stages of larvae, the second floating layer contained a mixture of kernels infested with early-stage larvae and lightweight sound kernels. The nonfloating residue was nearly all sound kernels.

It is suggested that the immersion of samples of commercial wheat in a solution with a specific gravity somewhere between 1.190 and 1.050 could be used to give a fairly accurate estimate of the intensity of infestation present on the basis that if more than one kernel contains advanced-stage larvae, this fact would be evidenced by floating kernels.

Purpose of Study

Emphasis during recent years on grain sanitation has stressed the necessity for a rapid and simple method of determining the amount of larval infestation in wheat (commonly termed internal infestation). Various methods are available to the trained technician, but they are not in general suitable for use by commercial grain handlers. Investigations of separation of infested from noninfested wheat by flotation were conducted at Manhattan, Kansas, 1952-54, and the results are reported here.

Frankenfeld (4)* developed the acid fuchsin stain method for detecting hidden infestation in wheat. The fuchsin stains the gelatinous plugs which cover the punctures in the kernels through which the eggs were deposited. The degree of internal infestation can then be estimated from the number of plugs observed.

Apt (2) found that wheat kernels with holes by which weevils have emerged can be segregated from sound wheat by a flotation method in which wheat samples are submerged in a solution of ferric nitrate. The solution does not flow into the hole to fill up the void left by the emerged adult, and the trapped air floats the kernel. Determining the number of infested kernels per 100-gram sample was formerly the method advocated by the Food and Drug Administration (8) for establishing whether wheat met the requirements for freedom from weevil infestation.

Another relatively efficient method is the cracking-flotation technique (5). Kernels of wheat are rough ground or cracked sufficiently to release the immature forms of the weevils, which are then segregated in solutions of alcohol and gasoline. This method requires use of the microscope to identify the insects or their heads.

The most efficient method of determining the degree of internal infestation in wheat to date is use of the X-ray (7, 9). Radiographs are made from a sample of wheat and these are scanned for infested kernels. Various techniques such as the soda straw technique (3) have been used to make examination of the negatives easier.

Another method of detection is the sodium hydroxide gelatinization process (1) wherein wheat kernels are boiled in a solution of sodium hydroxide until the more advanced stages of internal infestation become visible (6).

Limitations common to the foregoing methods are that they are time consuming, expensive, technical, or not adapted for field use.

Earlier studies (10) had proved that there is a detectible loss in weight of wheat kernels infested with the rice weevil after only one week of larval feeding.

Since the density of wheat is fairly constant it seemed logical that infested kernels could be separated from sound kernels by using the weight factor. The immersion of wheat in a solution or solutions of controlled specific gravity appeared to offer the most feasible method of separating the wheat kernels of different weights.

There were two objectives in this study. The first was to determine whether the range of the density of sound kernels of wheat overlapped the range of the density of kernels infested with the rice weevil. The second objective was to determine whether, in case the first phase of the study showed an overlapping of the ranges, a multiple separation might be accomplished by the use of two solutions of different specific gravities.

Techniques and Materials

The density of hard red winter wheat, the type most common in the Kansas area, is about 1.4. After some experimentation, sodium silicate solution ($Na_2Si_4O_9$) was selected as a material that could be easily adjusted to specific gravities below 1.4. This material, commonly known as

(Continued on page 22a)

*Numbers in parentheses refer to literature cited at the end of the article.

Table 1—The Degree of Separation Between Noninfested and Weevil-Infested Wheat Attained by Immersion in Sodium Silicate Solutions of Various Specific Gravities

Specific gravity of solution	Kernels in sample	Noninfested kernels			Infested kernels			Floating kernels infested
		Total	Floating Actual		Total	Floating Actual		
	No.	No.	No.	%	No.	No.	%	%
1.050	623	531	0	0	92	40	43.5	100
1.100	553	453	0	0	100	48	48.0	100
1.110	496	412	0	0	84	42	50.0	100
1.120	461	369	0	0	92	50	56.0	100
1.130	455	370	0	0	85	51	60.0	100
1.140	444	367	0	0	77	50	64.9	100
1.150	551	452	0	0	99	71	71.7	100
1.160	337	276	0	0	61	35	57.4	100
1.170	368	289	0	0	79	52	65.8	100
1.180	364	285	0	0	79	54	68.4	100
1.190	421	360	0	0	61	47	77.0	100
1.200	276	227	1	0.4	49	35	71.4	97.2
1.250	390	339	35	10.3	51	34	66.7	49.3
1.300	392	306	36	11.8	86	82	95.3	69.5
1.350	178	119	76	63.9	59	59	100.0	43.7

Table 2—The Degree of Separation Between Noninfested and Weevil-Infested Wheat of Four Test Weights and Three Moisture Contents, Attained by Immersion in a Nonmiscible Combination of Sodium Silicate Solution of 1.160 Specific Gravity Floating on a Methyl Chloroform-Deodorized Kerosene Solution of 1.300 Specific Gravity

Test weight and moisture content	Kernels in sample	Noninfested kernels				Infested kernels				Kernels infested in—		
		Total	Floating in— Top layer	Middle layer	Sinking to bottom	Total	Floating in— Top layer	Middle layer	Sinking to bottom	Top layer	Middle layer	Bottom layer
	No.	No.	%	%	%	No.	%	%	%	%	%	%
Test weight, 58 lb.— Moisture content:												
10%	479	402	0	34.8	65.2	77	68.2	19.5	14.2	100	9.7	4.0
12%	389	341	0.9	65.7	33.4	48	83.3	14.6	2.1	93	3.0	0.9
14%	422	283	.4	53.4	46.3	139	84.1	13.7	2.2	99.2	11.1	2.2
Test weight, 53 lb.— Moisture content:												
10%	453	414	0	13.8	86.7	39	74.4	20.5	5.1	100	12.3	.5
12%	411	337	0	25.2	74.8	74	85.1	12.2	2.7	100	9.5	.8
14%	373	300	0	54.3	45.7	73	87.7	9.6	2.7	100	4.1	1.4
Test weight, 60 lb.— Moisture content:												
10%	358	287	0	3.1	96.9	71	73.2	18.3	8.5	100	59.1	2.1
12%	319	240	0	12.9	87.1	79	48.1	36.7	1.5	100	48.3	5.4
14%	300	243	0	47.3	52.7	57	70.1	28.1	1.8	100	12.2	.8
Test weight, 62 lb.— Moisture content:												
10%	452	369	.3	8.4	91.3	83	67.5	20.5	12.0	98.2	35.5	2.9
12%	373	303	0	11.9	88.1	70	67.1	27.1	5.7	100	34.5	1.5
14%	340	243	0	8.2	91.8	97	81.5	7.2	8.2	100	23.1	3.5

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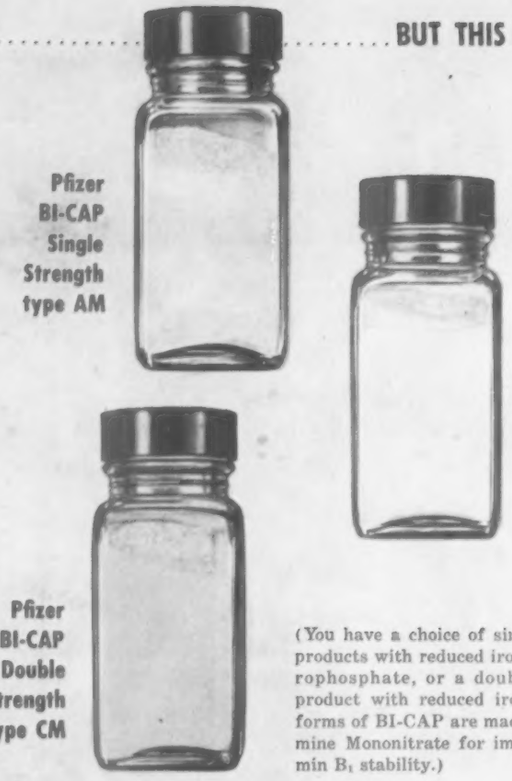

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Determination of Conditioning By Measuring Softness

By Ing. H. S. Smeets and Dr. Heinz Cleve

EDITOR'S NOTE: Dr. Heinz Cleve is head of the research laboratories of MIAG, the milling engineering firm with headquarters at Brunswick, Germany. Mr. Smeets is an engineer. Translation of the article from the original German was made by R. R. Vitols and R. E. Brown of the International Milling Co.'s research department.

* *

The aim of grain conditioning is to bring milling capability to an optimum condition and, if possible to improve the baking quality. While there are many research methods for the improvement of baking quality through conditioning, it is possible to determine the changes of milling capability only in the grind itself and through the determination of moisture. The biting test cannot be used as a method of measurement. The problem of improvement of milling capability can be divided into several partial components:

1. The improvement of separability between endosperm and bran.
2. Toughening the bran.
3. The adjustment of the right moisture content and the right distribution of moisture in the kernel.
4. The softening of endosperm.

Up to now, out of these four requirements, it is possible only to determine the moisture content. When the mill strives to maintain uniform flour, it is important to make the first break grain with uniform softness. We propose, thereby, under softness, not to consider the condition of the whole kernel, but only the state of the endosperm. The endosperm should easily crumble. In milling language, paralleling softness, we use the meanings hard, soft and vitreous, starchy. Hard wheat, Hard Endosperm, Vitreous Endosperm, Soft Wheat, Soft Endosperm, Starchy Endosperm, Mellow Endosperm.

Of course, there are many transition stages. The right softness for wheat ready for grinding is a certain optimum condition of the endosperm structure. The hard wheats do not possess too much optimum softness and, therefore, they have to be softened. Often the soft wheats are too soft. It is known that besides softening, the outer formation of the kernel such as kernel size, the thickness of bran, and the depth of crease are playing a role in milling capability.

Conditioning and Softness

This should be left out of consideration, because our measuring apparatus should measure the connection between conditioning and softening. One of the functions of wheat conditioning is to convert the unsatisfactory soft kernels into the degree of softness which is needed for milling.

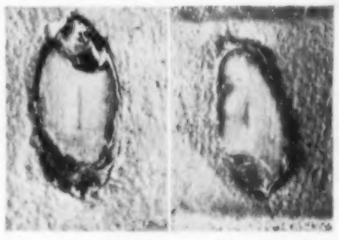
The softness of wheat stands in relationship to its moisture content and the period of staling after conditioning. As ways to reach such condition, cold and hot conditioning can be used. Opinions about it, how the softening can be carried through the best, vary. We do not want to go closer to the different theories in this question because our measuring method makes it possible to determine information regarding this.

We know that there exists in practice an urgent necessity to obtain a measuring method by which it would be possible to measure the softness degree and therewith, after conditioning, it would be possible to bring to grinding, mixes with a uniform softness degree. From experience we know that the grain condition is just as important as mill adjustment.

Methods of Research

The old methods which show grain milling capability are by Pelshenke and Hampel (Grain and Flour pages 4, 2, 9, 54). None of these, also the durotest methods which were lately developed by Kuehne, determine only the endosperm structure, but the entire kernel hardness as well. We consider the separate determination of bran and endosperm structure essential for grinding and, therefore, our method of research was aimed at separate determination because the formation of semolina and amount of produced semolina depend only on the endosperm structure.

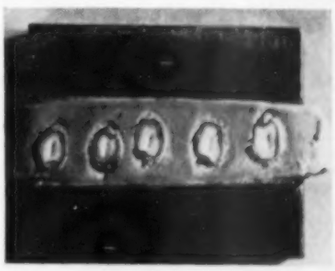
We started our measuring of softness with the consideration that the most important factor for milling is to determine the structure of endosperm. In order to begin with a clear picture, we meaasured the bran and endosperm separately. In these considerations we were strengthened during the development of our method by Pelshenke (Grain and Flour 4, 2, 9, 54) who referred to the particular importance of determining separately the hardness of endosperm.



No. 1 No. 2

The results of measurement of softness have to correspond to the practical experience in milling capability. They have to give exact values when and under which circumstances the optimum condition of milling capability is reached. On the other hand it should enable the miller to ascertain whenever the mix, ready for milling, is uniformly softened.

Under the method of research a diamond is pressed into the kernel. This diamond is like a dull pyramid. The size of the right angle was based on the results of many investigations. The depth of the dent varies between 20-80 microns. According to the depth of dent, the latter has a certain length, which can be measured by a lens with small enlargement. The deeper the diamond was pressed into the kernel, the larger was the dent and the kernel was softer. Picture No. 1 shows a dent in a soft kernel. The reverse means a smaller dent, a shorter dent length and a hard or vitreous kernel, as illustrated in picture No. 2.



No. 3

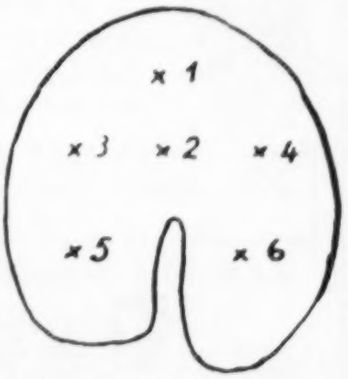
The measuring is carried through as follows: It is necessary to imbed the tested grain. For this we have used the matrixes shown in picture No. 3. The grooves of the matrixes shall be filled with a mortar which contains a quick drying material. Five kernels should be inserted. The imbedded mass is hard after a short time. To set the endosperm free for its measuring, the kernels should be filed off with a file. Then the matrix shall be moved underneath the crush body of Smetar, an apparatus manufactured by MIAG and each kernel pressed separately with the diamonds. Then the lengths of dents should be measured by using a lens with octahedral enlargement. The average of measured lengths is found out by measuring five kernels or, at variable softness, 10 kernels and this is used as degree for softness.

In case the toughness of bran has to be measured, it should be crushed before the kernels are filed and evaluated as mentioned before.

In the following detailed statements we have dealt only with the softness of endosperm.

(a.) A check of the usefulness of

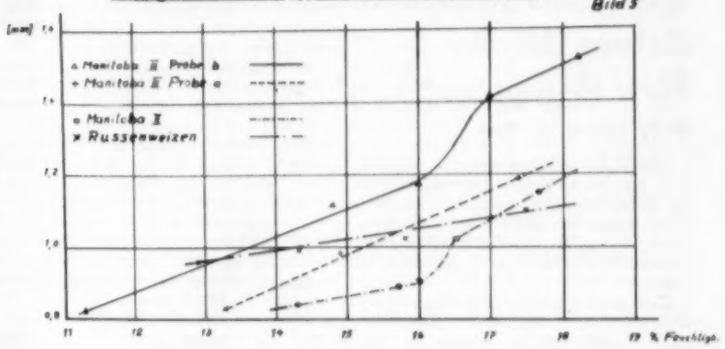
(Continued on page 10a)



No. 4

Endosperm. in Abhängigkeit von der Feuchtigkeit

Bild 5

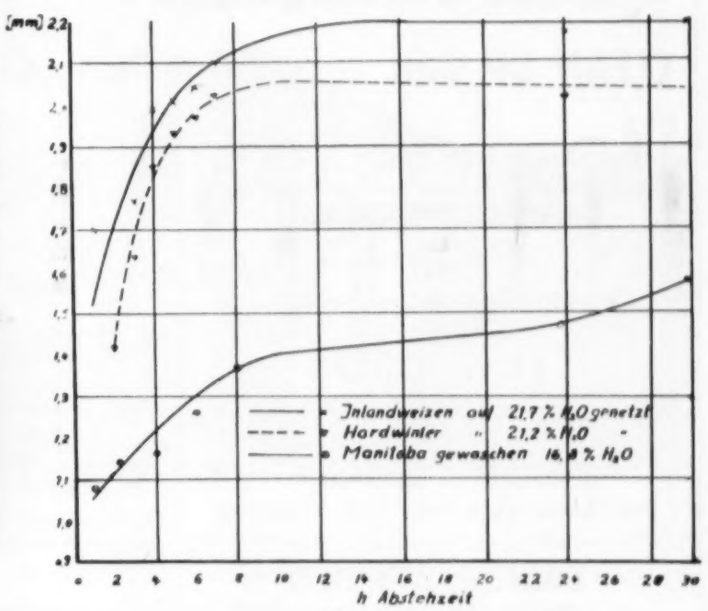


No. 5

TRANSLATION—Endosperm in Dependence of the Moisture. †—Manitoba III—Sample b. +—Manitoba III—Sample a. o—Manitoba II. x—Russian Wheat. %—Moisture.

Bild 6

Endospermmürbigkeit in Abhängigkeit von der Abstehzeit



No. 6

TRANSLATION—The softness of endosperm in connection with the length of soaking time. x—German Wheat Moistened up to 21.7% H_2O. †—Hard Winter Moistened up to 21.2% H_2O. o—Manitoba Washed 16.8% H_2O.

Questions to Ask Before Buying New Equipment

● By Ernest W. Fair

When the milling plant executive sets out to buy new equipment for his plant he should bear in mind that if he makes any bad decisions thereon he is going to be stuck with that equipment for a long, long time to come.

The seriousness of moving slowly and cautiously cannot be underestimated. Hasty decisions invariably mean selection of a unit the purchase of which he may well regret before it has served a single month.

Here are a number of points every executive should consider closely before purchasing equipment of any kind.

● Can the unit be afforded? There's more to it than having the financing to handle the purchase. Each piece of equipment must be capable of making a profit when it is put to use. That production efficiency must be equal to the rest of the equipment in the plant. Purchase should always be viewed from the standpoint of whether or not that particular unit can earn more profit than the one in current use.

● Will it handle every possible task in the future? Buying a unit to satisfy today's particular needs is far less profitable than selecting one which will not only handle today's requirements but those that are probable in the immediate future. Replacing such units is an expensive procedure; a miller cannot afford to junk the unit within a very short period of time in order to replace it with more adequate equipment.

● Is it the most versatile unit on the market today? Much as a miller may be sold on one particular piece of equipment the experts say it always pays to investigate the product of every manufacturer in the field. After the equipment has been purchased and set up in the plant it is too late to replace it with a better or more versatile unit. The time to make sure the very best, most efficient and most versatile piece of equipment is being bought is before the purchase order is signed.

● Will the particular unit get the job done? The matter of approach in considering this factor is of vital importance. Too often equipment is purchased with an eye toward adapting its performance to need. Experience has shown equipment purchases should be studied from the viewpoint of the job to be done and fitting the unit to that job rather than the other way around. A piece of equipment that is too good for achieving certain performance is just as undesirable as one which is not good or accurate enough.

● Have desired specifications been set up? Writing the specification should be the first order of business after the decision to buy has been made. And this can well be set down on paper for such specifications become vague when left to memory and are apt to be influenced by the sales pitch of the individual equipment salesman.

● Is every manufacturer's product being considered? The wise investment of such long term capital funds call for always making certain that information concerning every manufacturer's unit is available at the time the final selection is made.

● Will the unit under consideration fit into use of other possible pieces of equipment in the plant. The investment in this single purchase is small in comparison with the over-all investment in the plant itself. It is far less expensive to buy a unit which fits perfectly into the present flow of work than one which will require vast and expensive changes in the plant as it exists today. Versatility is desired to not only fit perfectly into the present set-up but to lend itself to future replacement of other units in an effort to increase over-all performance figures.

● Is it flexible? Flexibility becomes of more and more importance in considering future use of the equipment. It means that the unit under consideration should be adjustable to ranges in sizes and types of work that will be required, not just today, but in the future ahead. Wherever such flexibility exists added improvements in the future cost less than where it is absent.

● How high a degree of accuracy exists in the unit? Accuracy cannot be sacrificed for price or any other consideration. The competitive trend for the future is definitely toward more and more perfection. Such high degree of accuracy also assures top performance at all times and also is an asset in permitting use by less skilled personnel in an emergency.

● What degree of quality workmanship exists in the unit? Good workmanship in the essential parts increases equipment life and reduces troubles, breakdowns and inaccuracies. There is no real substitute for quality in any piece of equipment we may buy; other concessions serve only to cover up this important asset. Where quality workmanship is lacking useful life always is reduced and that means such a unit costs more in the long run than purchase of top quality would have in the first place.

● Does it possess simplicity of construction? This is a most important asset for it determines not only how

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easily the unit may be operated but high or low cost in disassembly and re-assembly, repair and maintenance. This asset, however, should always be viewed from the direction of how high a degree of quality can be obtained with such simplicity of construction and never from the standpoint of simplicity alone.

● How reliable is the unit? Taking chances, to save initial capital investment, on the performance reliability of any unit never saves money; it only adds to the year-in and year-out cost of use of the equipment. Dependability and reliability are musts for the equipment bought today.

● Is it easy to maintain and repair? This factor should always be given close scrutiny. A piece of equipment which needs special repair service or time-consuming maintenance every time it is out of order is definitely less desirable than one which can be serviced, maintained, and repaired with speed and low cost. Any design is undesirable which causes cumbersome work in dismantling and replacing or which involves extended delays in obtaining such service.

● What will be the installation cost? This is, the experts tell us, the most frequently overlooked point in equipment replacement consideration. Many a unit which appears less expensive turns out to be the most costly of all by the time it has been installed and put into use. The cost of installation should always be considered in analyzing such pieces of equipment of any kind.

● How safe is the unit? Sometimes manufacturers find they can keep costs down below the competitive average by sacrificing safety features or specifying these as extras to the purchase price. In any unit where there are more than the usual danger points and additional protective devices are exceptionally expensive or will not fully cover the dangers, it is best not to buy such unsafe units.

● Will it fit into the space available? Space, weight and height are all important considerations. Where the unit will require major structural changes or additional space this cost factor must be taken into consideration in choosing between one or the other.

There are, of course, other factors which pertain to each specific unit but the foregoing represent points which every executive can well apply to the purchase of any piece of equipment as factors of basic consideration.

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British Monsanto Chairman Change

ST. LOUIS—Monsanto Chemicals, Ltd., U. K. subsidiary of Monsanto Chemical Co., has elected Sir Miles Thomas a member of its board and designated him as board chairman sometime prior to July 1.

Sir Miles has been chairman and chief executive of British Overseas Airways Corp., a position which he has resigned. He will succeed Edward A. O'Neal, Jr., of St. Louis, who has been board chairman of Monsanto Chemicals, Ltd., since 1946. Mr. O'Neal became plant manager of the company's former phosphate division plant at Trenton, Mich., in 1941. He was promoted to production manager of the division in 1944. Mr. O'Neal will continue as a director of the subsidiary and parent companies and vice president for international operations of the Monsanto Chemical Co.

Niagara District, AOM, Has Annual Spring Meeting

BUFFALO — Reports on automation, wheat tempering and milling developments over the past 50 years were among the highlights of the annual spring meeting of the Niagara District, Association of Operative Millers, held here March 24.

Carl C. Giltner, Pillsbury Mills, Inc., Buffalo, chairman of the district, presided. A turnout of 125 persons was recorded.

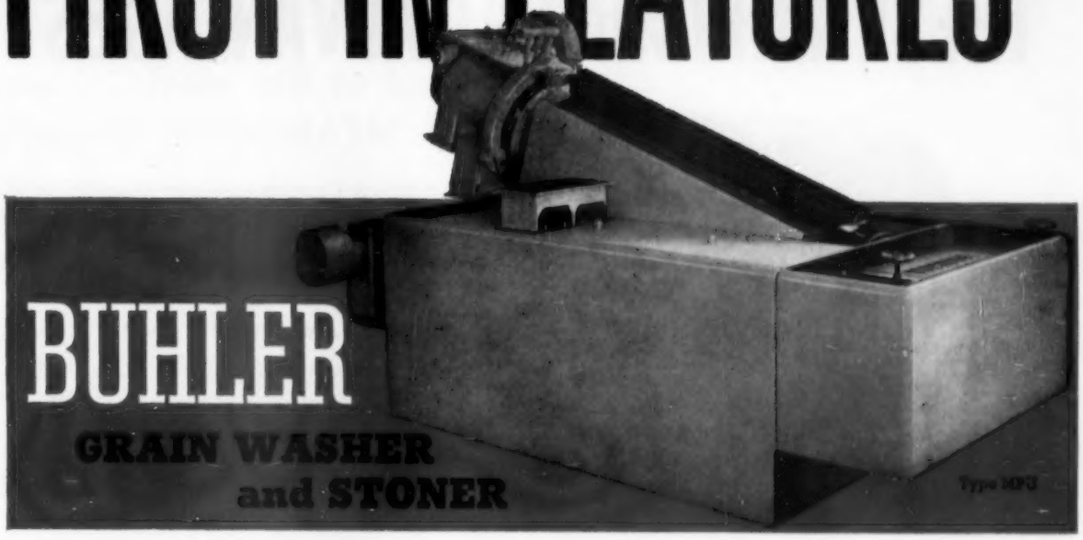
N. H. Turner, industrial relations manager of Pillsbury at Buffalo, in extending a welcome from management, requested the operative millers' continued support in developing the manpower he called so vital to the future of the flour milling industry.

Ward R. Flach, Eastern States Farmers Exchange, Buffalo, after reminding the group that Buffalo not only leads the country in flour production but also in feed production, gave a detailed report on the steps that have been taken in automation in the feed milling industry.

A talk on automation in flour milling was given by R. J. Hoskins of the Safety Car Heating & Lighting Co., New Haven, Conn. Mr. Hoskins differentiated between "mechanization" and "automation" and presented some of the possible future uses of automation in the flour mill.

The afternoon session started with a report on the AOM's 1956 technical conference at Dallas. This was presented by Arthur N. Hibbs, International Milling Co., Buffalo, who

FIRST IN FEATURES—



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is the program chairman for the technical conference, and Roy F. Kehr, Kressilk Products, Inc., Buffalo, Niagara district secretary. Howard W. Rogers, International Milling Co., then read his first prize entry in the district's 1955 essay contest, "Mill Operating and Laboratory Reports and Their Application to Production and Quality Control in the Flour Milling Industry."

A paper on "Chlorination of Wheat Tempering and Washing Water" was presented by Meade C. Harris, Wallace & Tiernan, Inc., Chicago. E. J. Cecka, vice president, S. Howes Co., Silver Creek, N.Y., and Lyle C. Mertz, General Mills, Inc., Buffalo, and Niagara District executive officer, presented a review complete with slides depicting the progress of the S. Howes Co., which is this year celebrating its centennial in the milling industry.

The program was completed with a presentation entitled: "My First 50 Years of Experience in Milling" by William R. Burr, superintendent of S. J. Cherry & Sons, Ltd., Preston, Ont. Mr. Burr humorously traced his experiences by outlining developments that had occurred in the milling industry during the past 50 years.

The banquet was highlighted by a gift presentation to Mr. Burr from the district membership and the reading of letters from L. C. Robinson, AOM president, and Donald S. Eber, AOM secretary, congratulating the S. Howes Co. on its centennial.

—BREAD IS THE STAFF OF LIFE—

READY FOR HARVEST

FAIRMONT, NEB.—The Nebraska, Kansas and Colorado Grain Company's new grain storage and shipping units here are expected to be finished for this year's harvest, Ralph Swearingen, Fairmont manager, said. Capacity will be 50,000 bu.

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Careless Welding And Cutting Can Result in Fires

By T. A. Adler
Engineer
Mill Mutual Fire Prevention Bureau

Fire losses as a result of careless welding and metal cutting are approaching staggering figures. In both number of losses and dollar values destroyed, the increases are alarming and are disturbing to insurance underwriters and industrial plant management. During 1954-55 a steady increase in losses due to these operations was recorded in loss statistics and insurance records.

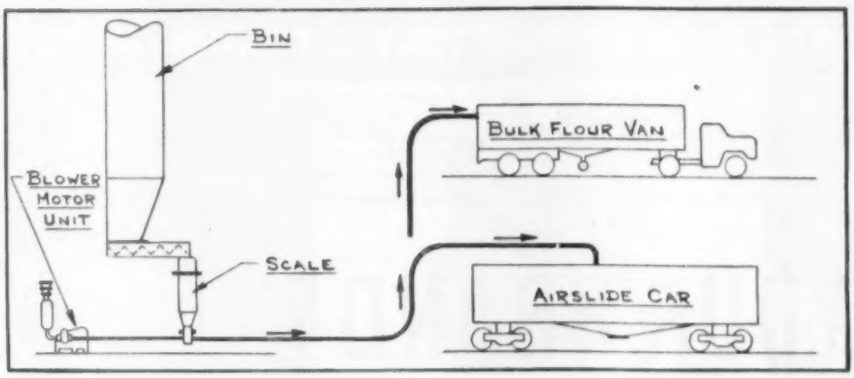
The year 1956 is just beginning but already the trend continues upward. It is foolish and unsound to hope for or expect a reversal of this trend until every operator of either an acetylene or electric welder recognizes the potential hazards involved in the use of his equipment and does his utmost to protect the property in which his work is to be done. Protecting against possible fire starts before the welder begins his work. It is at the time of planning for or the time of programming the work that fire precaution must be considered by management and supervisory personnel. Disinterest in the possible (more than likely probable) resulting fire damage to adjacent and surrounding property at this time is almost positive proof of what will follow. To permit any metal cutting or the welding of any machinery or structural parts without front office permit, thorough policing and cleanup, and full understanding of the dangers involved is doing no less than asking for disaster. When we add to the ordinary hazards those of a special nature and those requiring special care and precaution, it is simple arithmetic to arrive at the usual results—a fire.

One of these special nature problems is welding and cutting in areas containing combustible dusts. In a grain milling or storage building, these dusts are present in varying degrees, but are present nevertheless. The ease with which they can be heated to the ignition temperature demands that special care and thorough precaution must be exercised before, during and after any and all such work.

This merely means that under no circumstance will front office management allow either minor or major work of this kind inside buildings without first-hand knowledge of its necessity and the issuance of a work permit. A sensible precaution and one which can do more to promote safety than any other single item is that such a permit for welding or metal cutting be issued, followed through, and returned to responsible authority.

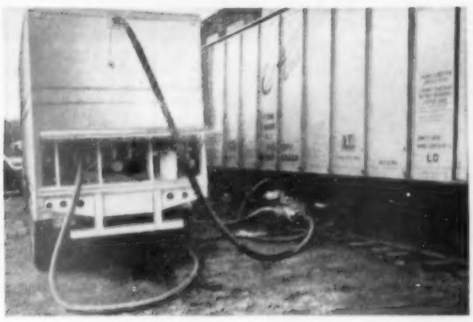
The procedure should be: (a) Issued by management interested in the protection of property. (b) Followed through during all phases of the preparatory and actual operations by responsible and reliable supervisory personnel. (c) Returned to management with signatures or other proof that all precautions were taken to avoid the occurrence of fire, and that a watchman is posted to be on the lookout for any signs of smoldering dust, materials or hot metal.

With an increasing amount of metal structures, machinery, machinery supports, spouting and con-



Loading flour at mill to either Airslide van or Airslide car.

All the way . . . from mill to bakery . . . with FULLER PNEUMATIC CONVEYING SYSTEMS



Unloading flour with Airslide transfer unit from Airslide car to Airslide bulk-flour van.

Airslide bulk flour van delivery to bakery. Note Fuller blow-through type feeder charging flour from Airslide fluidizing conveyors in bottom of van connected to conveying line to storage bins in bakery.

Now, for the first time, because of the joint facilities of Fuller Company and General American Transportation Corporation, a complete bulk-handling system is made available under one unit responsibility. All the way, from the minute flour leaves the bin in the mill, until it arrives at its destination, it is handled in a completely sanitary manner, free from comtamination.

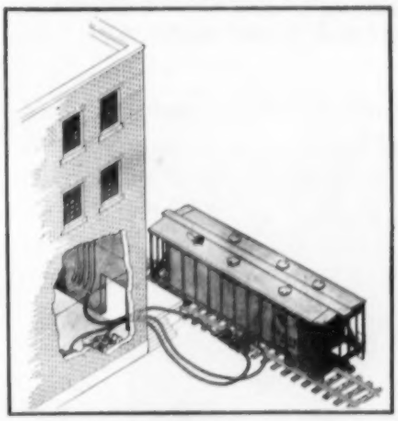
No matter if the bakery is located on a siding or not, Fuller is able to furnish equipment for unloading and delivering to your plant.

In addition to complete Airveyor® car-unloading and in-plant systems of the vacuum or pressure type, or combinations of both, Fuller has designed and built the Fuller Airslide® Portable-Transfer Unit, extending the field of application of both the Airslide bulk car and Airslide bulk flour van. Smaller bakeries, as well as large, can now realize savings possible by handling bulk flour.

For bakeries remote from a railroad siding, Airslide bulk cars can be unloaded with the Airslide Transfer Unit to Airslide bulk flour vans, the van discharging the flour direct to storage bins in the bakery. For the bakery having a siding, the unit can be used to transfer flour directly from Airslide cars to storage in the plant.

The Airslide transfer unit is a unique combination of the F-H Airslide air-activated gravity conveyor and Airveyor pressure type conveying system, wherein the flour is ideally fluidized by the Airslide for charging into the conveying system by the blow-through type of feeder.

Fuller is also in a position to furnish, for appropriate applications, principal system-proved components for in-plant conveying, such as blow-through feeders, rotary air locks, diverting valves, switches, and Airslide conveyors.



Unloading bulk flour with Airslide transfer unit direct from Airslide car to storage bin in bakery. Note blowers installed in bakery furnishing air for conveying and for actuating the Airslide Fluidizing Conveyors.

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veyors in the milling industry, it is evident that some repairs will require flame and arc welders and acetylene metal cutting. It isn't always necessary, however, that the work be done inside the building, or in an area where the hot metal and scattered sparks might cause ignition of surrounding materials. This is a phase of planning and organizing prior to doing the actual repair. Wherever possible, welding and cutting should be done outside or in an especially fitted room or area where safety precautions, equipment and surroundings are provided for this purpose only. Experienced mechanics, knowing not only how to use their tools, but also the fundamental safe practices required in the performance of their work can do much toward sharply reducing the present fire frequency. Inexperienced mechanics, or those unfamiliar with their surroundings are in themselves, dangerous to have around.

Safe Practice

Safe practice rules and precautionary measures both contain their "Don'ts and Do's". To prevent the occurrence of fire resulting from welding or cutting, all of the rules must be taken into consideration and put into practice. Thoughtfulness is one of the do's. Neglect is one of the don'ts. Careful thought and planning of what can result, and means of preventing it will pay dividends. Neglect to consider the possible ignition of any materials within a wide range and area can mean a disastrous fire. One important fact to bear in mind is that most fires as a result of welding occur after the job has been completed. Hot metal or sparks falling into grain dust or into combustible materials might not ignite the dust or combustibles immediately. More usually, a smoldering fire will linger for some time before flame is evident. This accounts for many night fires several hours after a plant has been closed. A watchman posted to be on the lookout for just such smoldering material is an important "do".

Cutting or welding on a bucket elevator, spout, screw conveyor or bin demands that all dust, whole or ground grains, or other combustibles be removed prior to applying the torch. It is likewise demanding that the insides of this equipment be thoroughly inspected and properly cooled before any material is again fed through them. This includes an inspection of the belt in the case of a bucket elevator.

Under no circumstance should any torch or arc welder be applied to any machine while it is in operation, or to any bin containing even small amounts of dust or grain. Spouting should be stuffed with soaking wet burlap below the point of cutting. Make certain that the burlap is removed from the building on completion of the work.

Bulletin Available

Safety practice rules for welding and cutting are outlined in a bulletin published by The Mill Mutual Fire Prevention Bureau, Chicago 6, Ill. Copies can be had without cost or obligation by a post card request. Post the bulletin where it can be read by mechanics and supervisors. Make certain that the rules are strictly adhered to. Don't take chances. Double the precaution and diligence, the chance of fire will be more than cut in half.

Fire prevention, like production, requires combined efforts and the cooperation of many to obtain favorable results. Precaution is a major factor in both endeavors. Thought, study and planning are part of precaution. Fruitful results and progress sometimes are dependent on past experiences. Certainly this is true in the principles of fire prevention. Study and research into past experiences are most beneficial in prescribing precaution for certain present undertakings. Safe practices, improved methods, personnel relations and manufacturing policies all are based on or contain a substantial measure of the recorded past. Future enterprise will depend greatly upon present day experiences. Like any other endeavor, fire prevention cannot live in the past, but to thrive and be of benefit to the individual and to industrial sustainment, past experiences must play their part.

——BREAD IS THE STAFF OF LIFE——

AOM Pacific District Plans Spring Meeting For April 21

PORTLAND, ORE. — The spring meeting of the Pacific District of the Association of Operative Millers is scheduled for April 21. Venue will be the Cascadian Hotel, Wenatchee, Wash.

Francis King, district secretary, reports that in addiiton to talks on technical topics, many subjects will be discussed on a round-the-table basis. Members have been invited to submit their problems.

Mr. King lists the most important subjects in milling practice at the present time as infestation, bulk flour handling, weights and measures, statistical quality control, wheat blending equipment, frequency of roll setting, dull versus sharp rolls, the care and importance of purifiers, the effect of wheat tempering and new wheat varieties.

The aim of the district is "to keep up to the times for flour milling," according to Mr. King's announcement.

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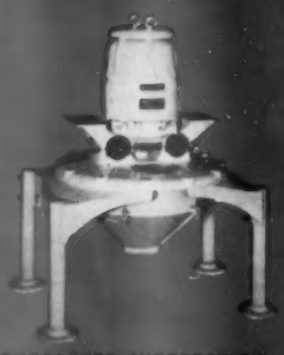

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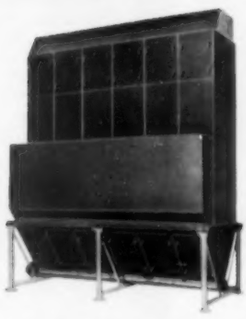

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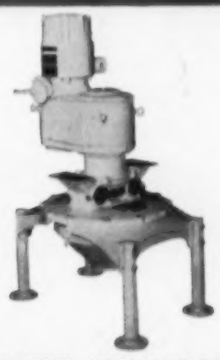

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MEASURING SOFTNESS

(Continued from page 3a)

the method. To determine the softness at different spots of kernel, the kernels of unconditioned wheat were filed variously and the dents taken at different places as shown in picture No. 4. Naturally, the vitreous and starchy kernels are different in softness. These differences show up in the measurements. The results of measurements are put together in Table 1, which at the same time gives a picture of the reproductiveness of the method.

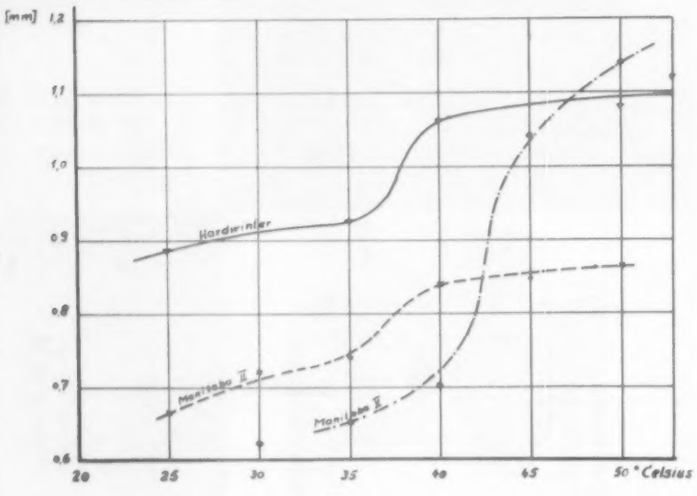
The values show the following: 1. Within the kernel can be measured approximately similar values. Only once the measured spot No. 6 showed up a harder structure than the other spots in the same kernel.

2. That the softness was different in vitreous and starchy kernels. Therefore, it would be better to measure 10 kernels in case the tested wheat is not uniform. In case the wheat lot is uniform, as perhaps after an appropriate conditioning, it is enough to measure five kernels. The measurements show that there does not exist a direct connection between vitreousness and softness.

(b.) Further measurements were carried through with unconditioned wheat of different origin, to check whether there exists the same soft-

Bild 7

Endospermmürbigkeit in Abhängigkeit von der Temperatur



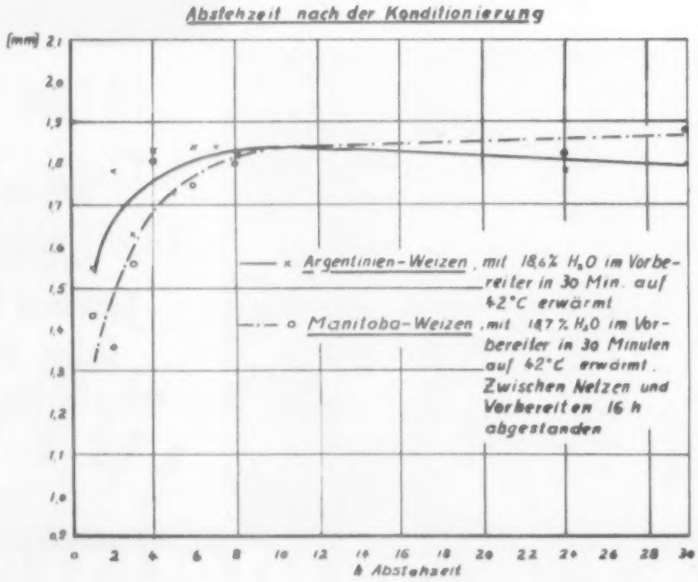
No. 7

TRANSLATION—The softness of temperature in connection with endosperm.

Bild 8

Endospermmürbigkeit in Abhängigkeit von der

Abstehzeit nach der Konditionierung



No. 8

TRANSLATION—The softness of endosperm in connection with soaking time after conditioning. x—Argentine wheat with moisture content of 18.6% temperature was raised to 42°C within 30 minutes by means of conditioner. o—Manitoba wheat with moisture content of 18.7% temperature was raised to 42°C within 30 minutes by means of conditioner. Soaking time between damping and conditioning 16 hours. At bottom: hours of soaking time.

Table 1—The Measurements of Softness on Different Places of Endosperm

	1	2	3	4	Av.
Medium vitreous kernel	1.0	1.0	1.2	1.1	1.1
Vitreous kernel	0.9	0.9	1.0	1.0	1.0
Starchy kernel	1.5	1.6	1.3	1.5	1.5
Vitreous kernel	1.0	1.0	1.0	1.1	1.0
Starchy kernel	2.2	2.1	1.9	2.0	2.1
	1.32	1.28	1.34	1.32	1.32

Another Five Kernels

	1	5	6		
	a	a	b	a	b	Av.
Vitreous kernel	1.0	1.2	1.2	1.2	1.1	1.1
Vitreous kernel	1.0	1.1	1.1	1.1	1.1	1.1
Vitreous kernel	1.2	0.9	1.1	1.1	1.1	1.1
Medium vitreous kernel	2.2	1.9	2.0	1.6	1.7	1.9
Vitreous kernel	1.3	1.3	1.3	1.1	1.5	1.3
	1.34	1.28	1.34	1.22	1.30	1.31

ness within the same origin but different deliveries. The results of such measurements are grouped in Table No. 2. The table shows that a different softness grade was measured even at the same moisture content. Also at lower moisture content the endosperm softness can be higher.

Table 2

Origin:	Moisture	Endosperm
Manitoba II	12.7	10.7
	13.2	11.4
	13.5	10.2
	13.9	9.4
	14.3	8.2
Manitoba III	13.3	9.5
	13.3	9.8
	14.2	9.4
	14.6	10.4
Hard winter	11.2	9.5
	11.5	8.9
	11.7	10.6
	12.2	11.0
	12.5	10.6
	12.8	10.1
Russian wheat	12.2	8.4
	12.4	9.2
	12.9	9.2
	13.0	11.2
	11.8	9.7
	12.0	8.4
	12.0	9.9
	12.0	9.1

As the wheats have to be ground at uniform softness, the method offers a means to determine the softness of unconditioned, and to run the preparation so that the desired softness can be reached.

(c.) If the method could be used, it must be realized that with the increase of moisture content, the softness could be increased, if that kind of investigations were carried through for different wheats. All samples were kept over night between moistening and measuring. Out of the established values were drawn curves as samples for wheat origins. The results show clearly that the softness of endosperm increases with soaking. (See No. 5.)

These values are of interest in that the softness of the different wheats is not in proportion to the moisture content. With the sample of Russian wheat and with the sample of Manitoba III, the softness practically rises linear with the moisture content, but the slope of the degree is different in both samples. With the samples of Manitoba III and Manitoba II between 16 and 17% of moisture, there is a bend in the straight line, going upwards. Similar circumstances we have found in many investigations but only in another moisture content range. Therefrom, we conclude that for many wheats the softness jumps above a certain moisture content in order to bring the line straight again.

(d.) To clear up the connection between the length of soaking time and softness there were moistened samples of different wheat origins which were found at that time on the market and their softness was measured at certain lengths of soaking time. These measurements are shown in the chart. (See No. 6.)

The length of soaking led to a constant increase of softness. For domestic German wheat the softness remains constant after 8-10 hours, while for Manitoba after 30 hours of soaking the limit was not reached.

(e.) The influence of conditioning on softness is of interest. To clear up this question measurements were subdivided into two groups before the conditioning was checked: One the temperature of conditioning and another the length of soaking. (See Nos. 7 and 8.)

These investigations show that the influence of temperature is different for individual wheat origins, as expected, and the curves run similar to those for the increase of softness with the moisture content. From the values which are given in the chart No. 8 following that of the conditioned wheat the softness increases with the length of softening time. If the wheat should be strongly softened, a certain soaking time is to be used after conditioning. At Manitoba III the highest value of softness was reached in 8 to 10 hours of soaking after conditioning in contrast with 30 hours at straight moistening; for the conditioned Argentine wheat after four hours.

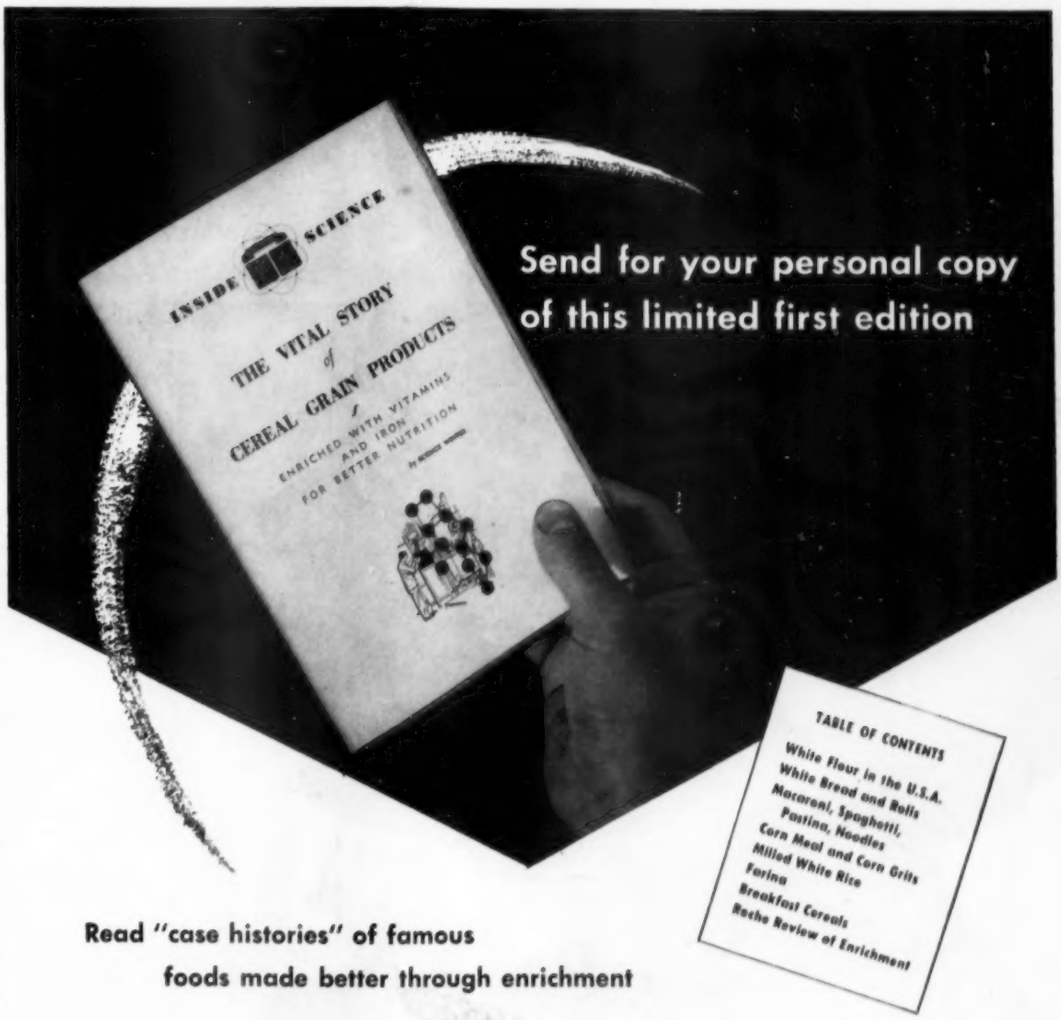
(f.) The selection of many measurements was carried through by one of us in the mill and the other in the laboratory. Our object, besides the investigation of usefulness of the method, was, thereupon, directed to test the method separately. We would like to mention only one group of examinations which might be extremely interesting to the miller. It concerns the question whether conditioning leads to a better softening than common mositening. In Table 3 are shown the investigations of conditioned and of moistened samples.

Table 3

Wheat:	Raw	Moistened	Conditioned
Manitoba III	0.84	1.17	1.34
Hard winter	0.58	1.14	1.35
Russian wheat	0.96	1.12	1.34

The conditioned samples in every case have considerably higher softness than the moistened. These measurements show that for the milling desired, softness can be reached best by conditioning.

At the beginning we mentioned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VICTOR CHEMICAL WORKS

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that it is necessary to reach a uniform softness for all wheat origins which are prepared for milling—to produce uniform flours and to set the grinding on the optimum values. It was decided to find in the mill whether through the measure method, constant operation and uniformity of flour quality could be obtained and whether it is possible to prove the influence of preparation.

On the basis of experience in previous investigations, the measuring of softness was applied as a guide for preparation, and grinding conditions were kept—fixed and constant.

After the softness measuring of conditioning was taken as a basis, expectations were fulfilled. We carried through the comparative experiments and at (1) experiment to set the conditioning according to the softness measurement and at (2) experiment to change the conditioning in case a mix of two origins should be milled (35 percent of mix). Both experiments were run over one day. The mixes came on the 1st Break with the same moisture content. Of both experiments there were drawn ash curves for an objective investigation of the mill. It showed at first that an abnormal conditioning could be made evident by a measuring with the Smetar already at the outflow of preparations. Also the soaking after conditioning did not reduce the measured differences in the endosperm softness. The measuring of softness showed also clearly that in one case the softness was not sufficient. At the experiment with insufficient conditioning in contrast with the normal conditioning, it was possible to determine on the break rolls that the break of grain was quite different. The covering of a separate roll pair showed up clear visible differences. The separate streams showed up a darker color for the experiment with abnormal conditioning. The ash curves of both experiments confirmed this, establishing as its course that the experiment with abnormal conditioning was essentially unfavorable than at normal conditioning. Also the color of streams and of the finished flours showed up a deterioration of grinding. With the softness measure determined, changes of grain caused also a poorer run of grinding. Therefore it shows clearly that the setting of the conditioner with the help of Smetars is much easier and leads to a better grinding.

Summary

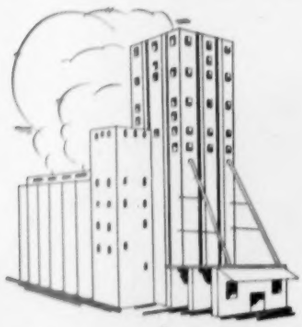
1. Out of theoretical considerations and practical measurements, it is shown that the measurements of softness at the entire kernel are available for the determination of effect of conditioning and the time of soaking. Smetar was developed as an apparatus which, through the measurements of bran and endosperm, was found a practical solution of softness measuring.

2. The measurings are not complicated and inexperienced personnel after a short time can use these measurings.

3. The practical results are good for the constant operation of the mill, flour quality and the check of conditioning.

4. The measurements which we have on hand confirm that the softness is a function of moisture content, temperature, and the length of soaking, and that through the warm conditioning can be obtained better results than by moistening and soaking.

5. Important results can be expected in the area of bran measuring.



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—BREAD IS THE STAFF OF LIFE—

New Arkansas Wheat Variety Recommended

FAYETTEVILLE, ARK.—The University of Arkansas' agricultural experiment station will offer registered seed this summer from a wheat variety which is said to have produced higher yields than any other variety now being grown in Arkansas.

The new wheat variety is Taylor, a soft wheat which was recently released by the U.S. Dept. of Agriculture in cooperation with some southeastern states. A 15-acre increase block is being grown at the Rice branch experiment station at Stuttgart, and registered seed should be available from that station this year.

Taylor produced a 1951-55 average yield of 38 bu. of grain per acre at the main experiment station at Fayetteville, and 39.8 bu. per acre at the Rice branch station at Stuttgart. These yields are 3.4 and 2.6 bu. per acre higher, respectively, than those produced by Chancellor, which is now the leading variety in the state.

Taylor is two to three days later than Chancellor. It possesses a little plumper grain, and is more disease-resistant. However, the variety may lack sufficient hardiness for the extreme northern hilly parts of the state, the university states.

Dr. R. L. Thurman of the agronomy department at the experiment station has studied the variety in tests in Arkansas. Because of Taylor's superior performance, he recommends that it be considered to replace such varieties as Vahart, Atlas 50, Fultz, Purplestraw, Blue Jacket, Clarkan, Hardired, Anderson, Sanford, Redhart, and Vigo.

—BREAD IS THE STAFF OF LIFE—

100,000-BU. CONSTRUCTION

LE SUEUR, MINN.—A new 100,000-bu. grain storage plant will be erected here by the Le Sueur Farmers Elevator Co.

Irradiation Used in Winter Wheat Tests

MEXICO CITY—A small group of winter wheat plants, growing in the hot, humid winter nurseries on the University of Minnesota's St. Paul campus, may give agronomists another many-years-ahead jump in developing more winter-hardy winter wheat.

Their seed had been irradiated in an atomic pile at the Atomic Energy Commission's Brookhaven, N.Y., National Laboratories. The object is to induce genetic changes that might make the plants more winter-hardy. Selected for the tests was a new line of winter wheat developed by university agronomists.

Dr. Elmer R. Ausemus, University of Minnesota agronomist and U.S. Department of Agriculture spring wheat coordinator, told the Third International Wheat Rust Conference here March 20 that already, at less than two months since planting, differences are showing up between the plants from irradiated seed and un-irradiated "controls" of the same line. More seedlings are growing from irradiated seed than from un-irradiated —and seedlings from irradiated seed are higher than those growing from un-irradiated.

This may be an indication that irradiated has induced greater winter-hardiness—an improvement that might take 10 or 15 years under the laborious crossing, back-crossing and selection program necessary to blend favorable strengths into grain varieties.

Dr. Ausemus said, however, that it may be a year or two before they know if irradiation has actually induced greater winter-hardiness and if it has changed the new line in other —and possibly unfavorable— ways, such as weakening its straw strength or lowering its milling and baking quality.

Now in a winter-increase program at Brawley, Cal., are fields of the new lines of irradiation-changed "Lee" bread wheat. The new "Lee" resists stem rust race 15-B, a major damager in recent years. Complex milling, baking and yield tests will begin this summer to see if irradiation has changed "Lee" in other ways.

"Lee" seed was irradiated at Brookhaven in the fall of 1953 and selections of superior offspring for increase have been underway since then.

—BREAD IS THE STAFF OF LIFE—

BUYS CHANNEL PLANT

SACRAMENTO—The Pet Milk Co. of St. Louis, Mo., has purchased the Channel Bakers plant in Fresno, Cal., from Walter C. Hanson & Son.

Richard Lamberson, counsel for the Pet company, said the concern will use the plant for manufacture of frozen pies for distribution throughout the San Joaquin Valley.

The sale included the building and bakery equipment and the lease on property across the street which recently was completed for frozen foods.

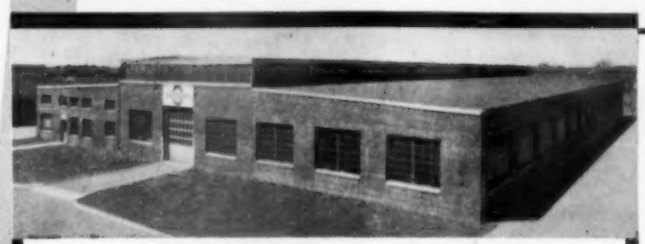
The bakery was founded in 1936 by Hanson and D. R. McKinley, now of Sacramento. Mr. McKinley sold his interest in the plant 18 months ago and operates a bakery here. He is taking over the bakery routes of Channel Bakers.

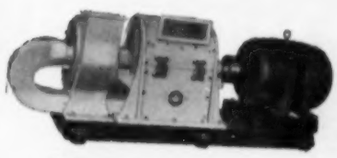
Mill Agent Named

NEW YORK—J. L. Hollis has been named mill agent at the Bagpak plant of International Paper Co. at Bastrop, La., it has been announced by J. P. Monge, treasurer of the company. This plant is one of three operated by the bagpak division of International which makes and sells multiwall shipping sacks. Mr. Hollis joined the bagpak division in 1948 as an assistant timekeeper. Prior to his present appointment, he was first clerk for the plant.

J. J. Patterson, Jr. William T. Bess, Jr.

APPOINTED—Union Bag & Paper Corp. has announced the appointment of J. J. Patterson, Jr., as director of multiwall bag sales. A member of the organization since 1936, Mr. Patterson has been associated with the multiwall bag division since its inception. Prior to his new appointment he served as field sales manager. At the same time the company announced the appointment of William T. Bess, Jr., as assistant director of multiwall bag sales. Mr. Bess joined the company in 1950 and served most recently as southeastern district manager of the multiwall bag sales division.





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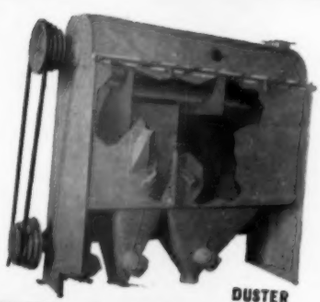

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Worth Looking Into

New Products
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New Literature

This reader service department announces the development of new and improved products, new services and new literature offered by manufacturers and suppliers. Claims made in this department are those of the firm concerned. Use the accompanying coupon to obtain the desired information.

No. 4051—Packaging System

An automatic packaging system originally developed by St. Regis Paper Co. to pack family-sized commodities such as flour and cornmeal into a St. Regis semi-rigid container, has now been broadened to permit the packing of smaller boxes or bags, cans or any commodity into open-end fiberboard containers or baler bags. The company announcement states that the semi-rigid container is made from a single ply of resilient, heavy-duty kraft paper. The packages of flour are not rigid in themselves, but when tightly compressed into the container—an operation which can only be done with automatic equipment—the whole unit makes a rigid package, it is claimed. Secure more complete information by checking No. 4051 on the coupon and dropping it in the mail.

No. 5397—Sifters

New literature on the Richmond line of sifters has been prepared by Sprout, Waldron & Co., Inc. Literature is available on the following trade-name products: The Gyro-Whip sifter which is capable of producing from two to 12 separations; the Super sifters which are ceiling suspended, capable of making up to eight separations and made in two, four or six sections; the Gyro-Lab sifters for research and light production work which make from two to five separations; and the Gyro-Pedestal sifters which have a single sieve, two separations and handle either batches or streams of free flowing materials containing small percentages of oversizes. The literature is available by checking No. 5397 on the coupon and mailing it to Feedstuffs.

No. 5399—Gyratory Screen

Allis-Chalmers Manufacturing Company's gyratory screen (Model CS-1) designed to provide separation of dry granular products into predetermined grades in the chemical processing, feed and food industries is described in a new bulletin released by the company. "Easy to install, operate and maintain, design features of the screen which provide better all-around performance are portrayed in the bulletin," the company states. The flexibility of screen combinations permits wide range of capacities, and the bulletin includes tables of estimated capacities for some 20 different products as well as for comparative openings of screen cloth. Secure a copy of the bulletin by checking No. 5399 on the coupon and mailing it.

No. 4050—Flour Mill Fumigant

The Stauffer Chemical Co. has prepared literature concerning its fumigant, Acritet 34-66, developed for use in flour mills, bakeries and similar establishments requiring periodic local fumigation of various equipment. The product serves as a supplementary measure to control insect infestations which develop in various conveyors, spouts, bins, etc., between the periods of general space fumigations, according to the literature. It is recommended for the treatment of food processing machines where infestations in such machines cannot be controlled by other methods. It is claimed not to affect food products or leave residues. Secure the literature by checking No. 4050 on the coupon and mailing it.

No. 3851—Bulk Flour Bulletin

An illustrated four-page bulletin describing the Fuller Airslide transfer unit, a portable unit for unloading bulk flour, is now offered by the Fuller Co., a subsidiary of the General American Transportation Corp. Three photos in the bulletin show the transfer unit at work in its two-fo'd function: Unloading flour from a bulk railroad car to a bulk flour van, and unloading from the van to storage bins at a commercial bakery. Two diagrams show how the portable unit can be used with the company's Airveyor pneumatic pressure equipment, either for car-to-van unloading, or for direct car-to-bin unloading when the bakery is located at a siding. A half-page drawing shows the transfer unit in clear detail, with special emphasis on the two flanged and gasketed outlets which clamp on to hoppers at the bottom of the railway car. The hydraulic system for keeping these outlets tightly pressed against the hoppers, as unloading proceeds and the car rises on its springs, is explained. Bulletin No. TU-1, describing the portable transfer unit, is available if you will check No. 3851 on the coupon and mail it.

No. 5396—Vibrating Screen

A new high-speed vibrating screen called by the trade name "HS Vibrex" for fine screening wet or dry materials has been developed by Hewitt-Robins, Inc. It has been especially designed for use with screen cloth of 10 to 80 openings per lineal inch, but under certain conditions is suitable for separations as high as 100 mesh. The manufacturer claims the screen is 30 to 80% faster than previous mechanical screens. It has a speed of 3,300 rpm when set for 1/32 in. stroke, and 2,400 rpm when operating on 1/16 in. stroke. An oil mist system is said to prevent overheating of bearings. The screen requires less headroom than previous models and handles most materials at an inclination of 10 to 15°, according to the maker. For more information, please check No. 5396 on the coupon and drop it in the mail.

No. 5383—Hydraulic Lift

The Crown Controls Co., Inc., has announced features of its new E-Z lift (model LT-1000) 1,000-lb. capacity hydraulic lift for use where limited space is a problem. The lift is for one-man operation and has a push-pull handle which operates the hydraulic mechanism located at a convenient height on the lift. Loads can be elevated to any height between 5¼ in. and 54 in. above the floor. The lift rolls smoothly on roller bearing equipped rubber front wheels and roller bearing equipped swivel-type rear casters. The positive-action brake is foot operated and has a trigger release. The lift is equipped with a safety overload release which refuses loads of more than 1,200 lb. Constructed of strong tubular steel, the lift is 64 in. high, 24½ in. wide and 35 in. long. It weighs 270 lb. The safety plate platform is 24 in. by 24 in. Straddle capacity is 16¼ in. Secure more complete details by checking No. 5383 on the coupon and mailing it.

No. 5361—Scale Bulletin

A new six-page, two-color bulletin describing a versatile bulk weighing scale for process weighing is offered by Richardson Scale Co. Described is the model E-50 scale which is electrically controlled and pneumatically operated. It is said to be completely automatic in operation. It will weigh nearly all dry, granular, small lumpy, crushed and powdered materials. The bulletin discusses the scale's construction, capacity, accuracy, and process weighing features. It describes such special features as a hopper door flapper, different inlet chutes, recording counter, accurate knife edge weigh beam and optional agitator and subsidiary beam equipment. For more complete details check No. 5361 on the coupon and mail it to this publication.

No. 5360—Feeder

The Omega Machine Co., division of B-I-F Industries, Inc., is manufacturing the Hi-Weigh, model 37, belt gravimetric feeder for continuously feeding dry materials at medium to high rates. This feeder, with a feature called Sens-A-Gram, has a super-sensitive controller which maintains accuracies well within + or — 1%, it is claimed. It offers built-in 100-1 variable speed transmission and a single power source with no auxiliary drives. Being introduced is a new line of gravimetric feeders of the loss-in-weight type for feeding a wide range of liquids and solids. Simplex and Duplex models are available

Send me information on the items marked:

- ☐ No. 3851—Bulk Flour Bulletin
- ☐ No. 3866—Controls
- ☐ No. 4050—Flour Mill Fumigant
- ☐ No. 4051—Packaging System
- ☐ No. 5360—Feeder
- ☐ No. 5361—Scale Bulletin
- ☐ No. 5383—Hydraulic Lift
- ☐ No. 5388—Safety Booklet
- ☐ No. 5396—Vibrating Screen
- ☐ No. 5397—Sifters
- ☐ No. 5399—Gyratory Screen

Others (list numbers) .....

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in several sizes for feed rates from 1 lb./hr. to 60,000 lb./hr. Equipped with a "built-in memory," the feeder, with an accuracy of + or — ½% by weight, is available with totalizer, indicator or recorder, the company states. Check No. 5360 on the coupon and mail it to secure more complete details.

No. 3866—Controls

New developments in the use of electronic control instruments to automatically regulate the flow of flour, cracker meal, sugar, shortening and oil in bakeries are announced by the Fielden Instrument Division of Robertshaw-Fulton Controls Co. The controls operate on the principle of electrical capacitance. These capacitance controllers, called Tektors, are said to sense minute changes in electrical currents, caused by changes in the level or flow of a material. Secure more complete details by checking No. 3866 on the coupon and mailing it.

No. 5388—Safety Booklet

Railroad cars and rodent control are among the many topics discussed in a new booklet on safety in the grain milling and storage business. The booklet, titled "Your Guide to Safety in Grain Milling and Storage," has just been released by the Accident Prevention Department of the Association of Casualty and Surety Companies. The 32-page, two-color booklet is a practical safety manual for use with both new and veteran employees of firms that mill or store grain. An introductory message directed to employees and signed "The Management," points out that "the idea that accidents are unavoidable and will always happen is wrong. Practically all accidents can be avoided by taking common-sense precautions." The booklet then passes on safety rules and tips on a wide variety of topics including, in addition to those already mentioned, the following: general safety; conveying equipment; bagged material stacking; manually operated vehicles; power trucks; loading platforms; hand tools; ladders; electrical hazards; manlifts; elevators and hoists; dust hazards; welding and cutting; grain fumigation (vermin control), and off-the-job safety. A single copy and information on ordering the booklet in bulk quantities may be obtained by checking No. 5388 on the coupon and dropping it in the mail.

Also Available

The following new products have been described in previous issues and information about them may still be obtained by jotting the appropriate number on the coupon and forwarding it to this magazine.

No. 3833—Package tying machine, B. H. Bunn Co.

No. 3834—Monthly formula service, Wilson & Co.

No. 3835—Stainless steel scoops, pails and funnels, Star Stainless Screw Co.

No. 3836—Revolving cake stands, Cake Stand Manufacturing Co.

No. 3837—White polyethylene coated board, Gair Cartons Division, Robert Gair Co.

No. 3838—Island type bakery display stand, Maine Manufacturing Co.

No. 3840—Water conditioner, Packard Manufacturing Co.

No. 3841—Display case catalog, Maine Manufacturing Co.

No. 3842—Sugar facts report, Refined Syrups & Sugars, Inc.

No. 3843—Bulk trailer, Vacu-Veyor Division of Vacu-Blast Co., Inc.

No. 3844—Lubricant, Warren Refining & Chemical Co.

No. 3845—Topping, S. Gumpert Co.

No. 3847—Upright freezer, Federal Refrigerator Manufacturing Co.

No. 3849—Stabilizer, Seaplant Chemical Corp.

No. 3850—Sweet dough base, H. C. Brill Co., Inc.

No. 3851—Bulk flour bulletin, Fuller Co.

No. 3852—Freezer for storage or self-service use, H. C. Rhodes Bakery Equipment Co.

No. 3853—Sweet dough stabilizer, H. C. Brill Co., Inc.

No. 3854—Truck letters, Plasticles Corp.

No. 3855—Cream filling, S. Gumpert Co.

No. 3856—Toppings and fillings, Max Ams Co.

No. 3857—Edible oil filter, Industrial Filtration Co.

No. 3858 — Automatic doughnut making, Doughnut Corporation of America.

No. 3859 — Teflon tape, United States Gasket Co.

No. 3860—Utilities cost booklet, Rateonics Corp.

No. 3861—Banana baking recipes, Banamash division of the Catz American Co., Inc.

No. 3862—Pan Service, Chicago Metallic Manufacturing Co.

No. 3863—Film sealer, Cleveland Heat Sealing Equipment Manufacturing Co.

No. 3864—Bakery fixtures, Maine Manufacturing Co.

No. 3865—Depanning service, Mallet & Co., Inc.

No. 3866 — Electronic controls, Fielden Instrument division, Robertshaw-Fulton Controls Co.

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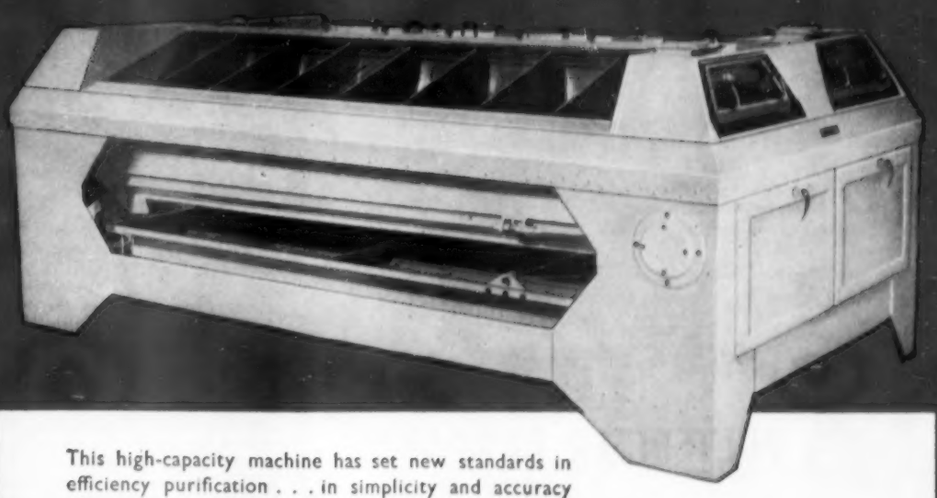

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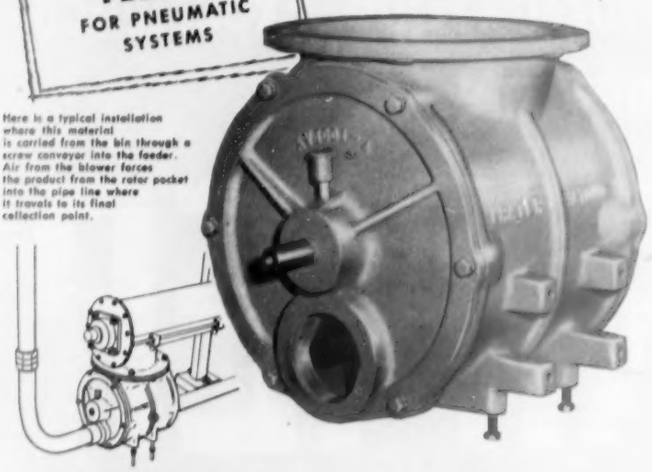

Here is a typical installation where this material is carried from the bin through a screw conveyor into the feeder. Air from the blower forces the product from the rotor pocket into the pipe line where it travels to its final collection point.

No matter how attritionized the product, this new Prater Blow-Thru Feeder will feed it efficiently and quickly into any pneumatic system. And this new design becomes an integrated part of the pipe line and will feed against pressures as high as 10 PSIG . . . either positive or negative!

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MIAG ADDS TO STAFF—Frank Heide, vice president and technical manager of MIAG Northamerica, Inc., announces two additions to the company's staff serving millers in the U.S. and Canada. Ernst Auer, a member of a milling family of the same name in Cologne, Germany, has been in the U.S. since 1954 working with a prominent milling company. He was apprenticed in milling, mill construction and chemistry and attended the German School of Milling in 1949-50. Before coming to the U.S. he worked in the family firm. Hans J. Koch has been transferred from the parent firm of MIAG in Brunswick, Germany. He is a graduate of the German School of Milling, Department of Milling Technology.

Purification, Bakery School, Separator Described for District 4, AOM

MINNEAPOLIS—A talk on purification, a film about the Dunwoody Industrial Institute in Minneapolis, and a description of an Electro Static Separator made up the program for members of District 4 of the Association of Operative Millers in Minneapolis March 24.

The meeting was opened by the district chairman, Richard C. Bradford, Pillsbury Mills, Inc., and the program was moderated by Frank Lindholm, superintendent of the King Midas Mills, Hastings, Minn.

Eric A. Stanger, manager for Henry Simon, Ltd., the British milling engineering firm, in Minneapolis spoke on purification with particular reference to the evolution of a new purifier from the first plans of finalization.

Mr. Stanger explained: "Usually, it takes about five years before the average machine is produced for use in a flour mill. That is to say, there are five years of persistent work involved after a design becomes a laboratory model, before it is thoroughly tested and made as a prototype, tested under as many varying conditions as can be created, and then produced on a commercial basis."

Referring to the Type S Purifier recently developed by his firm, Mr. Stanger said that it required a great deal of research and testing. The question of speed had to be studied, the question of throw, the angle of inclination of the sieve, the width of the sieve and the potential capacity. In addition, there had to be persistent searching tests into methods of air design. The application of multiple sieves had to be considered. In considering this particular point, Mr. Stanger reminded the operative millers, one has to remember that the

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For All Roll Corrugating
Economical Increased Output
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Doty Technical Laboratories
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more decks one has, the higher are maintenance costs, and that efficiency with simplicity are always desirable features.

Drawing on the experience of the Simon firm, Mr. Stanger gave instances of problems which were met and solved.

Edward Harding of the Dunwoody Industrial Institute described the commercial baking program undertaken for students from many U.S. areas and from abroad. Part of the program included visits to flour mills so that the bakers, all of whom must have had a minimum experience of six months in the trade, could appreciate the problems of the millers from the selection of the grain to the finished product. He showed a film depicting the history and development of the organization.

William Luger, Superior Separator Co., described the operation of his company's Electro Static Separator, giving examples of what it can do for several industries. Mr. Luger answered several questions from the floor on the operation of the instrument.

In the evening the district had a banquet, followed by music and entertainment provided by members of the allied trades. In charge of the allied trades' arrangements was Clifford Scott, Merck & Co., Inc. About 125 millers, allied tradesmen and their wives attended the banquet.

Walter Thulin

3 Men Added to New ADM Department

MINNEAPOLIS—The addition of three new men to the staff of the recently formed development department of the Archer-Daniels-Midland Co. has been announced by Dr. George Nelson, department director.

Walter Thulin has been assigned to agricultural products; Donald A. Beadell has been appointed manager of industrial chemicals department, and Dr. Verne C. Bidlack, Jr., will work with resins and plasticizers.

Mr. Thulin, a native of Minneapolis, held the position of supervisor of new product development for a local milling firm before joining ADM. He has bachelor of chemistry and bachelor of business administration degrees from the University of Minnesota. In 1954 he received his master of business administration from the Harvard Graduate School of Business.

Mr. Beadell spent nine years working with industrial chemicals at General Aniline & Film Corp., New York.

Dr. Bidlack previously worked as a development engineer in the chemical division of the Celanese Corp. of America. Prior to that, he was chief organic chemist for Henry K. Wampole & Co. and research chemist in the fabrics and finishes department of Dupont.

—BREAD IS THE STAFF OF LIFE—

Race 15-B Declines

MEXICO CITY — Stem rust race 15-B, since 1950 a leading damager of durum and bread wheats, is on the decline. This fact came from Donald M. Stewart, a United States Department of Agriculture plant pathologist stationed at the University of Minnesota, in a talk before the third International Wheat Rust Conference here. Mr. Stewart explained that in northern U. S., stem rust race 15-B was 47% of all wheat rust races picked up last year—in 1953, it was 63%. Race 15-B lost ground in Mexico, too. In 1953, it was 35% of all races found—in 1955, 18%.

—BREAD IS THE STAFF OF LIFE—

TO BUILD ELEVATOR

CLEAR LAKE, IOWA—The Farmers Cooperative Assn. here has announced plans to build a 200,000 bu. concrete storage elevator.

Soil Bank Advantage Cited by Economist

MINNEAPOLIS — A leading agricultural economist told the Minneapolis Grain Shippers Assn. that he likes the soil bank idea "because it moves in the direction of cutting wheat production." About 600 million bushels of our surplus wheat should be removed, said Dr. O. B. Jesness, head of the department of agricultural economics at the University of Minnesota, in emphasizing that the present surplus of one billion bushels is excessive.

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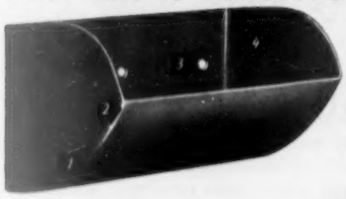

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Handling Systems Analyzed

Manpower Requirements in Handling Sacked Materials

What are the manpower requirements in different systems of handling sacked ingredients or sacked finished feeds? How do the systems compare?

These questions and their answers made up part of a talk given by Richard Sheehy of the Quaker Oats Co., Chicago, at the last Midwest Feed Production School in Kansas City, sponsored by the Midwest Feed Manufacturers Assn.

Mr. Sheehy, feed production supervisor for Quaker Oats, described the results of a study of methods of handling sacked materials. The study applied specifically to sacked ingredients, but the findings also related to the handling of finished feeds.

In his discussion of sacked materials handling, Mr. Sheehy first pointed out that many feed manufacturers today are not able to handle bulk materials for one reason or another. And those who do have bulk operations obviously cannot have a 100% bulk plant because some of the ingredients will be handled in small quantities that will not justify bulk handling.

Also, almost all feed plants handle finished feed in bags.

For these reasons, a study of sacked materials handling is of interest to all feed mill operators.

For many years, Mr. Sheehy noted, incoming sacked ingredients have been unloaded by hand from railroad cars or trucks. In almost all cases, this is still true today. There are a few cases of inter-plant shipments where sacked materials are shipped on special pallets, the entire pallet being unloaded mechanically at destination.

Two Operations

"At present, however, I know of no arrangement whereby regular suppliers ship their products on pallets," Mr. Sheehy said. "We are then still saddled with the necessity of unloading cars or trucks by hand. Admitting that we are stuck with this operation immediately gets us to the two fundamental operations involved in handling sacks — (1) piling or unpiling and (2) transportation.

"Starting with these two concepts, the essential things to keep in mind when analyzing a material handling problem are: (1) How many sacks can a man load or unload in a given time, and (2) how much time is spent in moving the sacks from one point to another?"

Several years ago, Mr. Sheehy explained, Quaker Oats undertook an involved study in handling methods in an effort to establish the most efficient operation possible. The study, he said, really boiled down to a number of ideas or facts which everyone had long considered but had never really thoroughly analyzed.

Four Systems

It may be noted first that there are four fundamental systems for handling sacked materials:

1. The manual system—where the operator literally carries a sack from one point to another, taking it from one pile and placing it on another.

2. The hand truck system—where the operator loads a truck, pushes or pulls it a certain distance and unloads it by hand.

3. The conveyor system—where the operator, either or both, places sacks on and takes sacks off a conveyor belt that moves from one point to another.

4. The fork truck system—where the operator piles or unpiles and transports over any distance unit pallet loads of sacks.

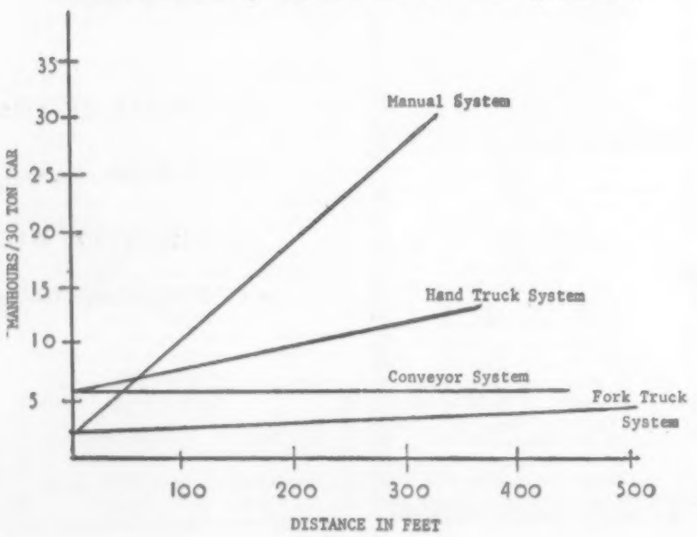
In analyzing costs for each system, Mr. Sheehy said, it is necessary to start with certain facts applying to each system.

First, the following analysis is confined to the handling of 100-lb. sacks since the package will apply to both ingredients and finished feeds.

It's assumed that a man can lift and put down 200 sacks per hour. This figure may sound high, but it should be noted that this involves only piling and unpiling, with no walking or moving from point to point. It's also assumed that a man in an average plant can travel or walk at a rate of 240 ft. per minute.

The problem will be to unload a box car containing 600 sacks of in-

Material Handling Methods for Sacked Ingredients



gredients and move them to a storage area 240 ft. away.

Manual System—If a man can pile up sacks at a rate of 200 per hour, it will take him three hours to finish the 600-sack car. If he travels 240 ft. per minute and it is 240 ft. from car to storage area, it will take 600 one-minute trips to the storage area and 600 one-minute trips back to the car. This adds up to 20 hours. All totaled, 23 man-hours have been spent to unload the car.

Obviously, this method is not a common practice in many mills, but it serves as an example of the first fundamental system of handling sacks. Mr. Sheehy drew a curve representing this system, using varying distances and varying numbers of sacks. (See graph.)

Hand Truck System — The next fundamental system is the two-wheel hand truck method, which is used widely in many mills. Here, a worker must pile up sacks twice—once on the truck and once from the truck to the storage dump. Three hours piling time would be spent in the first system. Now, with the hand truck system, there is a six-hour time for piling.

However, five sacks will be moved in each truck load in the same time one is moved by the hand method. To move 600 sacks five at a time will require 120 round trips instead of 600, so the total travel time will now be only four hours. And the total time for the whole operation is 10 hours.

When this is put on the graph, a noticeable improvement is shown.

It may be noticed that there is a small area on the left side of the graph showing the only range where a hand operation still has the edge over the other systems.

Conveyor System — Mr. Sheehy moved on to the third system—the conveyor system—where a new concept has to be set up. When a conveyor is used to move sacks from one point to another, travel time becomes zero. This is because the discussion involves only human travel time and not sack travel time.

With the conveyor extending into the car, a man has to place sacks on it. At 200 sacks per hour, it will take him three hours to finish the car. If the tail end of the conveyor discharges at the storage area, it will take another man three hours to repile the sacks for storage. Total time spent is 6 man-hours.

When this operation is put on the graph, it is immediately obvious that improved efficiency has been gained. It may be noted that with this system, the graph shows a perfectly horizontal line. In other words, it doesn't make any difference how far the sacks have to be moved because total man-hours remain the same.

Fork Truck System — The fourth system analyzed is the fork truck method. If a pallet is set right in the box car, it is still necessary to unload sacks by hand and pile them on the pallet. Thus, it is already established that this operation will take three hours. Travel time could be as much as 720 ft./min., and 20 sacks per pallet is not too much to expect. When these figures are worked out, it is found that total travel time to unload the car is only 20 minutes.

Since the pallets have only to be set down at the storage dump, no time is considered for a second piling operation. Thus the total time taken for unloading the car is 3⅓ man-hours. For the job described, the fork truck system clearly leads all the rest in number of man-hours required, Mr. Sheehy pointed out.

Referring to all the curves on the graph, Mr. Sheehy analyzed the findings and drew certain conclusions:

1. There does exist an area in which it is more economical simply to carry sacks than to use a conveyor or even a two-wheel truck.

2. It is always more efficient to use a conveyor system than the two-wheel truck if, when using the truck, sacks have to be piled up at the storage area.

3. It is always more efficient to use the fork truck system than either the manual or two-wheel truck system.

4. The fork truck system is more efficient than the conveyor system except where long distances are involved. This can be seen in the slight upward slope of the curve for the fork truck as opposed to the horizontal line representing the conveyor system. If the line for the fork truck system were extended far enough to represent greater distances, it would meet and then go above the line for the conveyor system.

The foregoing discussion, Mr. Sheehy pointed out, is confined to manpower efficiency. By comparing the difference in manpower efficiency and considering the magnitude of his operation, a feed mill operator should be able to determine what the best system would be for him from a capital investment point of view, Mr. Sheehy said.

—BREAD IS THE STAFF OF LIFE—

ELEVATOR TO BE BUILT

LURAY, KANSAS—A new 100,000-bu. grain elevator will be erected here by the Osborne County Farmers Union Cooperative Assn. The structure will be located on the site of the old 9,000-bu. elevator which is being razed. Frank Schurr will retire as manager, and Esthmer Boyle will replace him.

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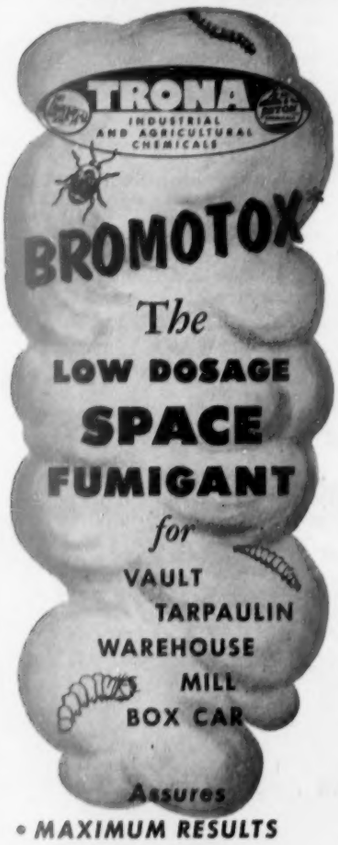

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FLOTATION

(Continued from page 1a)

water glass, is readily available. The specific gravity of the solution is adjusted by the addition of water. Doubtless there are other materials also suitable for use.

When a second solution was needed which could be adjusted to specific gravities below 1.4, and which would not be miscible with sodium silicate and water, a solution of methyl chloroform and deodorized kerosene was selected. Hydrolysis at room temperatures was negligible so that mixtures of sodium silicate and methyl chloroform remained nearly stable. Further testing is necessary to determine whether hydrolysis or specific gravity changes occur after prolonged use of these solutions.

An X-ray unit especially designed for the radiographic inspection of grain samples was used to check the exact percentage of internal infestation of all the grain samples, and also of the kernels separated by flotation.

Procedure

In the first phase of the study, solutions of sodium silicate were prepared, their specific gravity ranging from 1.050 to 1.350 in steps of 0.05 between 1.050 and 1.100, of 0.01 between 1.100 and 1.200, and of 0.05 between 1.250 and 1.350. Samples of hard red winter wheat with a 12% moisture content and infested with all stages of the rice weevil (Sitophilus oryza (L.)) were immersed in solutions at each designated specific gravity. Each subsample was then washed, dried, and X-rayed, and an exact count of the infested kernels in each part was made. Only kernels of normal size and shape were considered in making the determinations in the surface (floating) layer.

In the second phase of the study, samples of infested wheat having test weights of 56, 58, 60 and 62 pounds per bushel, were tempered to moisture contents of 10, 12 and 14% for each test weight. Samples of each lot were immersed in a two-layered, nonmiscible combination of a sodium silicate solution with a specific gravity of 1.160, floating on a methyl chloroform - deodorized kerosene solution with a specific gravity of 1.30. A specific gravity of 1.160 of sodium silicate was selected as one which would give a reliable separation, and still allow a broad margin of variability both in procedure and in wheat characteristics.

Results

By immersing samples in sodium silicate solutions ranging in specific gravity from 1.050 to 1.350, varying degrees of separation of weevil-infested from noninfested wheat were obtained (Table 1).

At the lower part of the range, about 50 to 70% of the infested kernels were floated off the grain samples with no sound kernels floating. At all specific gravities between 1.050 and 1.190 the floating layer contained only infested kernels, and no sound kernels. The proportion of infested kernels that appeared in the floating layer increased until all infested ones floated at 1.350. However, at this point, many lightweight sound kernels floated also; 56% of the floating layer at 1.350 was composed of sound kernels.

The degree of separation resulting from immersion in the two-layered combination of samples of wheat varying in weight and moisture content is presented in Table 2. The 1.300 specific gravity solution of methyl chloroform and deodorized kerosene floated the kernels with early stages of infestation which sank in the 1.160 specific gravity solution of sodium silicate.

There did not appear to be an outstanding relationship between the degree of separation and the test weight or the moisture content. With three exceptions, the top floating layer contained only infested kernels. Nearly all of the floating kernels contained advanced stages of larvae. The middle layer contained a mixture of kernels infested with early stage larvae and lightweight sound kernels. The bottom layer was composed mostly of sound kernels.

Analysis of Results

These studies indicate that an absolute separation by flotation of infested from noninfested kernels probably will not be possible, but flotation may be used to indicate the presence of hidden infestation quite accurately.

When wheat was submerged in a solution with a specific gravity considerably below that of sound wheat, 50% or more of the kernels with internal infestation were separated from the sample by flotation in the range between 1.050 and 1.190. From radiographic examination it was determined that these kernels contained advanced stages of larvae, which is logical since their weight would be decreased to a greater extent than where small larvae were involved. Furthermore, no lightweight sound kernels appeared in the floating layer in this range. If most commercial wheat, therefore, is similar in respect to the range of specific gravity of its kernels, then it appears that it would be possible to separate that portion of the infestation in any sample that contains mature or nearly mature larvae. For this purpose the single solution would be adequate since no additional information would apparently be gained from a three-layer separation.

Although the exact degree of internal infestation cannot be determined by this method, an indication of the general severity of infestation can be gained on the basis that if more than one kernel contains advanced-stage larvae, this fact would be evidenced by floating kernels.

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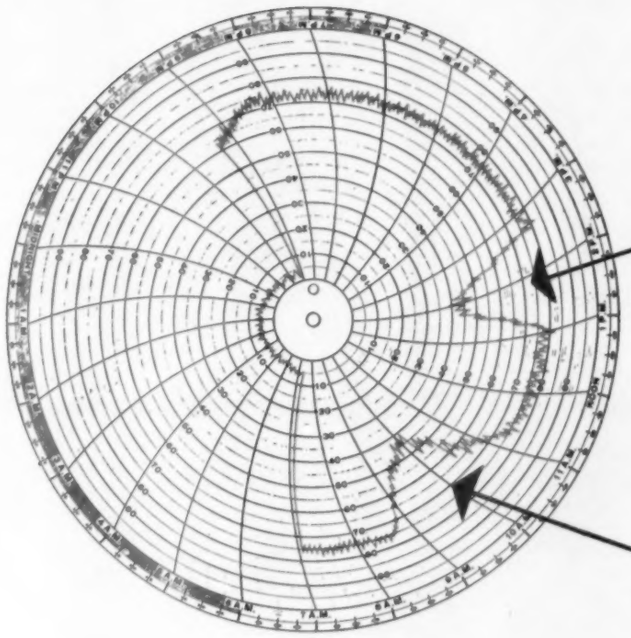

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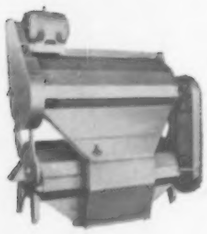

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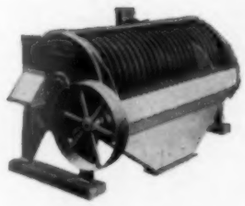

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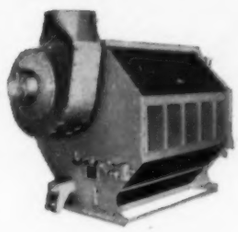

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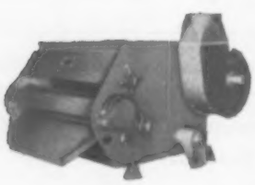

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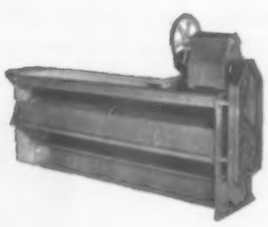

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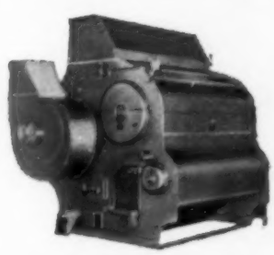

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